Computational Complexity
Exam (Theory Test)
9.02.2018

....
your name & index number

For each question, give answer: YES, NO, or NOT KNOWN. The third possibility means that the current state of knowledge allows for both possibilities. All questions are equally valued, there are no negative points for wrong answer.

1. The following implication holds for every language L: if there is an algorithm (an infinite loop) that prints all words from L (every word from L exactly once; the order in which the words are printed is not specified), then L is decidable.   ....

2. SAT $\in$ **NTIME**(n^2).   ....

3. REACHABILITY is **NP**-complete.   ....

4. **NP$^{\text{NP}}$** = **NP**.   ....

5. The problem "is there a perfect matching in a given undirected graph" is **NP**-complete.   ....

6. HamiltonianCycle can be solved in polynomial space.   ....

7. Horn-SAT $\in$ **NC**.   ....

8. **coRP** $\cap$ **RP** $\subseteq$ **BPP** $\cap$ **coBPP**.   ....

9. VertexCover admits a polynomial time approximation with factor $\frac{1}{2}$ (finding a cover twice larger than the optimal one).   ....

10. **P** = **IP**.   ....

11. If **L** = **P**, then **PSPACE** = **EXP**.   ....

12. The following implication holds for every problem X with a parameter k: if X has an $O(n^{k^k})$ time algorithm, then X (with parameter k) is in **FPT**. ....